LOW-CURRENT AND HIGH-SPEED PHASE-CHANGE MEMORY DEVICES AND METHODS OF DRIVING THE SAME

Abstract of the Disclosure

Phase-change memories in which phase is changed by varying the resistance by a small amount are provided. In the phase-change memory, a set state is defined as a state where amorphous nuclei are formed in a phase-change layer of a memory cell and the phase-change layer has an initial resistance that is higher than in a crystalline matrix, and a reset state is defined as a state where the number and/or the density of the amorphous nuclei are greater than those in the set state and a resistance is higher than in the set state. A current for writing the reset and set states is reduced to several hundred microamperes, and a period required for writing the reset and set states is reduced to several tens of nanoseconds to several hundred nanoseconds.